Mass Transportation ıergy Conservation and Contingency Planning

A REPORT OF THE
TRANSPORTATION TASK FORCE
OF THE

URBAN CONSORTIUM
FOR TECHNOLOGY INITIATIVES

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The Urban Consortium for Technology Initiatives was formed to pursue technological solutions to pressing urban problems. The Urban Consortium is a coalition of 37 major urban governments, 28 cities and 9 counties, with populations over 500,000. These 37 governments represent over 20% of the nation's population and have a combined purchasing power of over $25 billion.

Formed in 1974, the Urban Consortium represents a unified local government market for new technologies. The Consortium is organized to encourage public and private investment to develop new products or systems which will improve delivery of local public services and provide cost-effective solutions to urban problems. The Consortium also serves as a clearinghouse in the coordination and application of existing technology and information.

To achieve its goal, the Urban Consortium identifies the common needs of its members, establishes priorities, stimulates investment from Federal, private and other sources and then provides on-site technical assistance to assure that solutions will be applied. The work of the Consortium is focused through 10 task forces: Community and Economic Development; Criminal Justice; Environmental Services; Energy; Fire Safety and Disaster Preparedness; Health; Human Resources; Management, Finance and Personnel; Public Works and Public Utilities; and Transportation.

Public Technology, Inc. is the applied science and technology organization of the National League of Cities and the International City Management Association. It is a nonprofit, tax-exempt, public interest organization established in December 1971 by local governments and their public interest groups. Its purpose is to help local governments improve services and cut costs through practical use of applied science and technology. PTI sponsors the nation's largest local government cooperative research, development, and technology transfer program.

PTI's Board of Directors consists of the executive directors of the International City Management Association and the National League of Cities, plus city managers and elected officials from across the United States.

Mass Transportation Energy Conservation and Contingency Planning

January 1980

Prepared by

PUBLIC TECHNOLOGY, INC.
1140 Connecticut Avenue, N.W.
Washington, D.C. 20036

Secretariat to the

URBAN CONSORTIUM FOR TECHNOLOGY INITIATIVES

URBAN CONSORTIUM FOR TECHNOLOGY INITIATIVES

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PREFACE

This is one of ten bulletins in the third series of Information Bulletins produced by the Transportation Task Force of the Urban Consortium for Technology Initiatives. Each bulletin in this series addresses a priority transportation need identified by member jurisdictions of the Urban Consortium. The bulletins are prepared for the Transportation Task Force by the staff of Public Technology, Inc.

Five newly-identified transportation needs are covered in the third series of Information Bulletins:

- Air Quality Regulation and Measurement
- Airport Access
- Mass Transportation Energy Conservation and Contingency Planning
- Non-Federal Street and Highway Financing
- Pedestrian Movement

Five Information Bulletins covering needs identified in previous years, are being updated:

- Accelerated Implementation Procedures
- Coordination of Paratransit with Conventional Transit
- Institutional Framework for Integrated Transportation Planning
- Neighborhood Traffic Controls
- Urban Goods Movement

The needs highlighted by Information Bulletins are selected in an annual process of needs identification used by the Urban Consortium. By focusing on the priority needs of member jurisdictions, the Consortium assures that resultant research and development efforts are responsive to local government problems.

Each bulletin provides a nontechnical overview, from the local government perspective, of issues and problems associated with each need. Current research efforts and approaches to the problem are identified. The bulletins are not an in-depth review of the state-of-the-art or the state-of-the-practice. Rather, they serve as an information base from which the Transportation Task Force selects topics that require a more substantial research effort.

The Information Bulletins are also useful to those, such as elected officials, for whom transportation is but one of many areas of concern.

The needs selection process used by the Urban Consortium is effective. Priority needs selections have been addressed by subsequent Transportation Task Force projects:

- A Manual for Planning and Implementing Priority Techniques for High Occupancy Vehicles (consisting of a Chief Executive's Report, Program Manager's Report, and Technical Guide) was developed to provide assistance to local governments in planning and implementing Preferential Treatment for buses and other high-occupany vehicles

- A National Conference on Transit Performance addressed the need for Transit System Productivity. The conference, held at Norfolk, Virginia, in September 1977, was attended by 200 government, industry, labor, and academic participants. As a follow-up to the Norfolk meeting, 5 Transit Actions regional meetings were held between January 1979 and May 1979. The product of these following meetings is a Transit Actions Workbook that features techniques currently being used to improve transit system performance and productivity.

- To facilitate the provision of Transportation for Elderly and Handicapped Persons, 6 documents were developed: one on local government approaches, a coordination guide, a planning checklist, an information sourcebook, a series of case studies, and a chief executive's summary.

- To help improve Center City Circulation two projects have been completed. A summary report on Center City Environment and Transportation: Local Government Solutions shows how seven cities used transportation and pedestrian improvements to help downtown revitalization. Another project, addressing the coordination of public transportation investments with real estate development, culminated in a national conference--The Joint

Development Marketplace, at Washington, D.C., in June 1978. The Marketplace was attended by over 600 persons, including exhibitors from 36 cities and counties and representatives of over 140 private development and financial organizations.

- Two documents relating to the need for Transportation Planning and Impact Forecasting Tools have been prepared: (1) A paper describing local transportation planning issues and concerns directed to the Urban Mass Transportation Administration and (2) A management-level document for local officials describing the tools available as a result of the Urban Mass Transportation research program and how these tools can be applied by local governments.

- To facilitate the dissemination of information on local experiences in Parking Management, a technical report describing the state-of-the-art is being prepared.

- A National Transit Pricing Forum was held at Virginia Beach, Virginia, in March 1979 to address the need for more information on Innovative Fares. Much of the Forum was directed to technical advances in areas of pricing research and practice. The proceedings of this conference are available.

Task Force information dissemination and technology sharing concerns are currently addressed by a series of SMD Briefs. These one-page reports provide up-to-date information about on-going UMTA Office of Service and Methods Demonstrations projects.

The support of the U.S. Department of Transportation's Technology Sharing Division in the Office of the Secretary, Federal Highway Administration, and Urban Mass Transportation Administration has been invaluable in the work of the Transportation Task Force of the Urban Consortium and the Public Technology, Inc. staff. The guidance offered by the Task Force members will continue to insure that the work of the staff will meet the urgent needs identified by members of the Urban Consortium for Technology Initiatives.

The members of the Transportation Task Force are:

- George Simpson (Chairperson)
  Assistant Director
  Department of Engineering
  and Development
  City of San Diego
  San Diego, California

- Edward M. Hall (Vice Chairperson)
  Street Transportation
  Administrator
  City of Phoenix
  Phoenix, Arizona

Transportation Task Force (continued)

- Ron Borowski
  Head, Transportation Planning
  Denver Planning Office
  City of Denver
  Denver, Colorado

- Gerald R. Cichy
  Director of Transportation
  Montgomery County
  Rockville, Maryland

- James E. Clark III
  Assistant Director
  D.C. Department of Transportation
  Washington, D.C.

- Kent Dewell
  Deputy Director, Public Works
  Department, Transportation
  Division
  City of San Jose
  San Jose, California

- John A. Dyer
  Transportation Coordinator
  Dade County
  Miami, Florida

- Clint Gregory
  Mayor
  City of Pierre
  Pierre, South Dakota

- David Gurin
  Deputy Commissioner
  New York City Department of
  Transportation
  New York, New York

- Bill Hellmann
  Chief of Interstate Division
  for Baltimore City
  Baltimore, Maryland

- Robert P. Hicks
  Administrator
  Planning and Traffic Engineering
  Division
  Department of Transportation
  Detroit, Michigan

- Rod Kelly
  Director, Office of
  Transportation
  Dallas, Texas

- Frank Kiolbassa
  Director of Public Works
  City of San Antonio
  San Antonio, Texas

- Gary Kruger
  Transportation Planner
  Office of Policy Planning
  Physical Planning Division
  City of Seattle
  Seattle, Washington

- Emily Lloyd
  Commisioner of Traffic
  and Parking
  City of Boston
  Boston, Massachusetts

- Alan Lubliner
  Center City Circulation
  Project Manager
  Department of City Planning
  City of San Francisco
  San Francisco, California

- Elizabeth McLean
  First Deputy Commissioner
  Department of Public Works
  City of Chicago
  Chicago, Illinois

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  Jacksonville Transportation
  Authority
  Jacksonville, Florida

- Ray Remy
  Deputy Mayor
  City of Los Angeles
  Los Angeles, California

- Stephen Villavaso
  Chief Planner, Transportation
  Policy Department
  Mayor's Office
  City of New Orleans
  New Orleans, Louisiana

PROJECT SPONSORS

- Alfonso B. Linhares
  Chief, Technology Sharing Division
  Office of Intergovernmental Affairs
  Washington, D.C.

- Norm Paulhus
  Technology Sharing Division
  Office of Intergovernmental Affairs
  Washington, D.C.

- James Bautz
  Chief, Paratransit & Special User Group Division
  Urban Mass Transportation Administration
  Washington, D.C.

- Milton Criswell
  Chief, Implementation Division
  Federal Highway Administration
  Washington, D.C.

- Brian Cudahy
  Director, Office of Transit Management
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  Washington, D.C.

- Robert Dial
  Director, Office of Planning Methods & Support
  Urban Mass Transportation Administration
  Washington, D.C.

- Barry Felrice
  Associate Administrator, Office of Plans and Programs
  National Highway Traffic Safety Administration
  Washington, D.C.

- Ronald Fisher
  Director, Office of Service and Methods Demonstration
  Urban Mass Transportation Administration
  Washington, D.C.

- Charles Graves
  Director, Office of Planning Assistance
  Urban Mass Transportation Administration
  Washington, D.C.

- Philip Hughes
  Director, Office of Policy Research
  Urban Mass Transportation Administration
  Washington, D.C.

- Henry Nejako
  Executive Assistant to Associate Administrator, Office of Technology, Development and Deployment
  Urban Mass Transportation Administration
  Washington, D.C.

- Kenneth Orski
  Vice-President
  German Marshall Fund
  Washington, D.C.

- George Pastor
  Associate Administrator, Office of Technology, Development and Deployment
  Urban Mass Transportation Administration
  Washington, D.C.

- James Yu
  Office of Policy Research
  Urban Mass Transportation Administration
  Washington, D.C.

PUBLIC TECHNOLOGY, INC.--SECRETARIAT

Gary Barrett, Transportation Director
Doris Ballenger
Rosalyn Dortch
Leon Fedele
Lisa Jolly
Lynn Mitwol
Helene Overly
Edith Page
David Perry
Kathy Perry
Ann Rabinowitz
Michael Replogle
Barbara Robinson
Peggy Schwartz
Carolene Smith
Leigh Stokes
Dani Williams
Judith Zimmerman

PROJECT CONSULTANTS

Fred B. Burke

William B. Hurd

Public Technology, Inc.
1140 Connecticut Avenue, N.W.
Washington, D.C. 20036
(202) 452-7700

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CHAPTER 1

ISSUES AND PROBLEMS

The United States like most non-OPEC countries, is facing serious, adverse, economic impacts because of the high cost of oil. The United States now imports approximately 50% of the oil it consumes, and half of this amount is used directly for transportation. The rising cost of this imported oil has affected costs in all aspects of transportation, most visibly at the gasoline pump. High gasoline prices and the increasing costs of owning an automobile are causing more people to rely on public transportation. This trend places a definite stress on public transportation capabilities and makes essential the conservation of fuel resources to maintain public mobility and contingency plans to meet a sudden fuel shortage.

Energy conservation planning includes most importantly an effort to reduce the demand for petroleum products. Conservation plans must be developed and implemented during times of adequate fuel supply, so continuous conservation efforts can ease the crisis when an acute fuel supply shortage occurs.

Energy contingency planning emerged as an effort to develop an effective, quick, response mechanism to avoid repetition of the chaos that followed the initial Arab oil embargo in 1973. Today, energy contingency planning acknowledges the likelihood of short-run fuel shortages and attempts to coordinate and identify means for meeting them. The Federal government, for instance, has produced guidelines and suggested strategies for use by State and local governments involved in contingency planning efforts. Contingency plans already developed on the local or regional level can be obtained through federal government publications or directly from the city or county government itself. Twenty completed studies and plans were obtained from local governments and transit authorities during preparation for this report. Chapters 2 and 3 contain references and summaries of these and other information resources.

Conservation and contingency planning go hand-in-hand. Contingency strategies are often defined as being merely short-term conservation strategies or stop-gap responses to energy shortages. Conservation is defined as "long-range initiatives to encourage behavior which results in the consumption of less energy."[1]

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[1]U.S. Department of Transportation, Transportation Energy Contingency Strategies Part 1: The Planning Process: Roles and Responsibilities, (Washington, D.C., 1980), p. 3.

This Information Bulletin examines some of the issues and problems facing local government officials and transit authority representatives concerned with developing conservation and contingency plans which will assure the continued movement of people and goods for the forseeable future, even during a sudden fuel shortage. Areas of concern addressed are:

- Conservation for Mass Transportation
- Contingency Planning Procedures
- Contingency Plan Components

CONSERVATION FOR MASS TRANSPORTATION

Two major issues which local governments must address to encourage fuel conservation for mass transportation modes are the need to influence personal travel behavior and the importance of developing alternative fuel sources.

Influencing Personal Travel Behavior

The challenge facing local level officials concerned with promotion of fuel conserving travel habits is three-fold.

Politically, local governments must be willing to use their authority to restrict automobile use, especially in congested areas and at peak travel hours. Fuel efficiency is lowest in these situations.

Institutionally, development and enforcement of conservation measures may be difficult and time consuming because of fragmentation of the planning process and lack of authority. Media campaigns and other cooperative efforts involving both the public and private sectors of a community may be needed for promotion of such things as ridesharing, vanpools, observance of the 55-mph speed limit, and general energy-wise driving habits.

Financially, local officials must apply scarce tax revenues to shared ride alternatives, so they may become an acceptable alternative to the private automobile.

By using the resources available in all three of these areas, local officials can take the following steps, as appropriate for the size and make-up of their jurisdictions, toward developing clear cut transportation conservation habits.

- Establishment of exclusive corridors for buses and carpools, such as the Shirley Highway corridor in Washington, D.C., to help minimize downtown traffic congestion and make bus commuting faster and more attractive.

- Encouragement of the development by major employers of carpool and vanpool programs.

- Limitations on downtown parking spaces available to private automobile commuters and the use of differential parking prices to discourage downtown commuter parking.

- Development of flextime programs with local employers.

- Construction of park and ride lots, including bicycle parking, in outlying areas to serve as feeder sources for public transportation.

- Construction of bicycle facilities to allow bicycles to be used on a large scale as a commuter travel mode.

- Improvement of traffic management techniques such as coordinated signalization and freeway ramp metering.

- Development of paratransit possibilities, through regulatory revision if necessary, to make possible such things as shared taxi rides and the use of school buses for public transportation.

- Integration of paratransit with the public mass transportation system.

- Coordination of land use policies and zoning decisions with transportation planning. Such policies and decisions have enormous long range potential for influencing future transportation needs.

Alternative Fuel Sources

The best method for conserving petroleum fuels is to utilize other fuel sources where possible. The energy crisis has motivated research and development of technologies which might eventually replace the gasoline and diesel powered modes of transportation. A description of the more promising of these alternate fuels and technologies is included in Appendix A at the end of this chapter.

When conservation measures are already in place, the crisis atmosphere which has pervaded past responses to fuel shortages will be somewhat alleviated. Establishment of adequate contingency plans appropriate for each jurisdiction becomes the next immediate need.

CONTINGENCY PLANNING PROCEDURES

The public expects a quick response on the part of its elected officials in times of crisis, but governmental responsibility for contingency planning often remains fragmented. In order to develop a coordinated, effective transportation contingency planning effort, the following steps are essential:

1. Definition of Planning Authority: A successful planning effort which will address all aspects of a region's transportation energy needs includes not only local officials, but also regional and State agencies, major employers, retail and industrial representatives, labor organizations, and the transit providers. Responsibility for plan coordination should be assigned to a control agency in such a broad based effort. The contingency plans developed for the cities of Dallas/Fort Worth and Washington, D.C. were coordi-

nated by the regional Council of Governments.[2] Metropolitan Planning Organizations may be another logical choice. The planning team or response team is then assembled to provide planning support.

2. Assignment of Task: Once authority has been defined, it becomes necessary to define tasks and duties not only for crisis situations, but for the planning effort itself. The contingency plan developed by the Southern California Rapid Transit District includes specific recommended actions for nine various district agencies including the District's Operations Department, the Personnel Department, and the Customer Relations Office. This detailed, thorough type of preparation will eliminate confusion if a sudden need for emergency action should arise. For example, which department will coordinate requests to the State for additional fuel supplies during a shortage? Which agency will be responsible for public information services, and who can best coordinate and encourage carpool and vanpool programs?

3. Resources and Training: Both the financial resources and trained or experienced staff needed to support contingency planning on the local level have been lacking. Most local governments have attempted to assign such duties to existing departments or staff along with their regular responsibilities. Only recently has the role of energy coordinator emerged as an independent position in local government. The analytical tools available for energy planning-related tasks are also limited or in developmental stages. An effective communications network can help locate resources and expertise required for transportation contingency planning. Techniques for monitoring energy consumption, predicting energy shortfalls, and identifying the impact they will have on transportation patterns are being developed in many localities. Evaluations of transportation modes based on energy use and even predictions of changes in travel behavior are being attempted around the country. Open communications between Federal, State, and local agencies will improve opportunities for obtaining grant monies or other assistance in support of contingency planning efforts. For example, a transportation energy contingency plan in-depth legal analysis paper was produced by the Mid-America Regional Council with funding obtained from the Urban Mass Transportation Administration. Existing resources may also be pooled as with the Dade County, Florida, carpool program. The Florida State DOT is donating use of its computer facilities in return for a chance to monitor the computer's performance under the program.

A good flow of information becomes vital during a crisis.

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[2]U.S. Department of Transportation, Transportation Energy Contingency Planning: Local Experiences, Washington, D.C., June 1979.

CONTINGENCY PLAN COMPONENTS

The transportation contingency plans which have been developed at the local level generally include an energy profile and address three basic objectives: reducing energy consumption and developing alternative fuel sources--that is, conservation; meeting the increase in demand for public transportation services during a fuel shortage; and assuring adequate fuel supplies for at least the most essential services.

Energy Profile

A basic understanding of the transportation energy requirements of an area is required in order to select or develop the most effective emergency response options. The depth and length of the profile may vary. One of the most extensive studies can be found in a report by the North Central Texas Council of Governments, A Metropolitan Transportation Plan for National Energy Emergencies.[3] Included is an extensive analysis of the 1973-74 oil embargo, the effects another crisis will have on the Dallas/Fort Worth transportation situation if it involves greatly reduced gasoline allocations or rationing, and a look at national as well as local energy consumption trends. Such an involved analysis is not always necessary nor possible if staff time and funding are not available. However, a basic look at energy use patterns, major energy sources, and potential problem areas is an essential first step in developing a contingency plan.

Meeting Increased Demand for Public Transportation

A fuel shortage will invariably cause many people to reduce their use of automobiles and turn to public transportation services. Sudden increases in demand can, in some cases, seriously exceed the capabilities of existing transportation systems. A contingency plan must explore ways to assure continued movement of people and goods. Methods for doing this focus on expansions of transportation system availability or capacity. Some common strategies included in contingency plans are listed below along with related issues or implementation considerations:

- Increase frequency of bus service, especially during peak hours when possible. Peak period ridership will increase noticeably during a fuel crisis, perhaps to the point of overloading capacity.

- Encourage additional flextime and variable work hours to increase transit capacity by spreading peak ridership.

- Establish additional high occupancy vehicle lanes, express buses, and park-and-ride lots.

- Increase bus fleets by stockpiling old buses. It was only recently that Federal regulations preventing bus equipment stockpiling were lifted, so start-up problems still exist. Buses may require exten-

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[3]See Chapter 2, p. 18

sive maintenance especially if they have been out of use. Maintenance required to keep excess equipment service-ready may be costly and burdensome, and locating available storage space may be difficult.

- Utilize school buses or commercial and church buses to supplement public transportation capacity. Not all State and local laws allow use of school buses for purposes not school related. Negotiations for their use might include addressing labor issues concerning additional personnel and insurance liability questions.[4]

- Private and auxiliary transit services can provide supplemental capacity: Adequate regulatory revision could allow jitneys, shared ride taxis, and other paratransit to function as feeder service for main transit routes or as shuttle service.[5]

A comprehensive guide to transportation contingency strategies is available from the National Technical Information Service.[6]

Assuring Adequate Fuel Supplies

Local government officials and transit agencies have no authority over fuel allocation procedures during severe fuel shortages. Provisions should therefore be contained within a contingency plan to assure adequate supplies of fuel for transportation services during a crisis. Two options to be considered are:

- Expanding Fuel Storage Capacity

Storing or stockpiling fuel is not only an operational safeguard against shortages, but is also a financial strategy used to avoid paying ever rising fuel prices. Charges of fuel "hoarding" may be heard occasionally, although this is far from being disincentive enough for local officials to ignore the value of bulk fuel storage facilities. Dade County, Florida, for example, renovated an abandoned U.S. Navy fuel storage facility which now provides a back-up fuel supply adequate for three months use. Having bulk storage facilities also provides an advantage when a jurisdiction is seeking additional fuel supplies under the Department of Energy regulations governing the State Set-Aside Fuel Allocation Program.

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[4]An Information Bulletin entitled "School Bus Use for Non-School Transportation" is currently being prepared by PTI and will be available in September 1980.

[5]An Information Bulletin entitled "Taxicabs as Public Transit" will be available from PTI in September 1980.

[6]Transportation Energy Contingency Strategies: Transit, Paratransit and Ridesharing Part 1: The Planning Process: Roles and Responsibilities, Part 2: Synopsis of Actions. This guide was produced by the Massachusetts Institute of Technology, Center for Transportation Studies, with support from the Federal Highway Administration and Urban Mass Transportation Administration.

- Obtaining Additional Supplies

Operators of diesel or gasoline powered mass transit, school, or chartered bus systems who have bulk storage facilities are entitled to 100 percent of their fuel needs during a shortage. If their regular suppliers are short, requests may be made for State Set-Aside supplies. Operators who do not have bulk storage facilities, however, must obtain fuel supplies from retail dealers. These users might make arrangements with other area users or distributors having bulk supplies, to purchase extra fuel. Contact should be maintained with regional fuel distributors as well as with State agencies to facilitate transfer of required fuel to priority transportation users.

In severe situations, application can be made for Federal assistance through the Department of Energy, Office of Hearings and Appeals.

Until the oil dependence of our transportation systems and networks is reduced through the development of alternative fuel sources, contingency and conservation strategies and a scramble for the fuel that is available will be the dominant forms of action.

CONCLUSION

Energy conservation and contingency planning are vitally important to meeting energy crisis situations. Precautionary measures such as those mentioned in this report will help local governments preserve fuel resources and deal with severe energy shortages, but they are not aimed at solving the real problem, which is the dependence of our transportation systems on petroleum based fuels. Local officials are faced with the challenge of how to assert their influence to change the energy consumption habits of their constituents without unduly limiting freedom of choice or forcing change against the will of the citizens. Transportation habits are beginning to change, however, as the increasing cost of gasoline and the uncertainty of our overseas oil supply sources become two important allies in meeting this challenge.

APPENDIX A

ALTERNATIVE FUEL SOURCES

This information has been extracted from a case study project performed under a grant to Public Technology, Inc., on behalf of the Urban Consortium for Technology Initiatives, from the National Science Foundation: Office of Intergovernmental and Public Technology - Spring 1980.

Alcohol Fuels

Alcohol fuels such as ethanol and methanol can be used as a primary fuel, or as a fuel supplement to gasoline. Ethanol, which is also known as ethyl or grain alcohol, is produced by the fermentation and distillation of grain, starch, or sugar products. When mixed with gasoline, this mixture is popularly known as "gasohol". Methanol (methyl or wood alcohol) is currently produced almost exclusively from natural gas at a rate of one billion gallons a year. However, methanol can also be produced from coal, or such renewable resources as wood or urban wastes. Both ethanol and methanol contain less energy than an equal amount of gasoline, and therefore more fuel would be required to power a vehicle. Mixed with gasoline, alcohol fuels can increase octane ratings (especially for unleaded gasoline), and research indicates a five percent increase in fuel economy may occur.

Vehicles designed to use gasoline, however, will encounter some problems when converted to alcohol fuel use. Alcohol can be corrosive to plastic and rubber fuel line components. In addition, methanol is corrosive to certain metals and would require fuel tank modifications on most cars. Since alcohol does not vaporize easily, engine starts in cold weather are more difficult. This difficulty is overcome either by preheating alcohol, or injecting an additive such as ether into the combustion chamber.

Several difficulties are also associated with the use of alcohol mixed with gasoline. Mixtures of alcohol and gasoline in warm weather produce high vapor pressures which may result in vapor locks. Increasing the proportion of gasoline in the mixture will solve the problem. Mixtures of alcohol and gasoline also have a tendency to separate in the presence of water (phase separation). Research indicates that additives may be available to control this problem.

According to the Department of Energy, by 1985 alcohol fuels will be able to replace 40,000 barrels of oil per day and may become a significant source of energy, especially in agricultural states.

Gaseous Fuels

Light vehicles can be powered by compressed natural gas (CNG--methane) or liquified petroleum gas (LPG--propane) which is derived from natural gas. Methane can also be produced through anaerobic digestion of solid waste or sewage sludge.

Most internal combustion engines designed to burn gasoline can be easily converted to burn gaseous fuels with the addition of storage tanks, flow regulators, and either a gas mixer, or gas carburator. A vehicle can be retrofitted to burn only gaseous fuels or can be converted through a dual fuel system to burn either gasoline or gas. The range for a gaseous fueled vehicle is limited by the availability of gas (which in most cases must be supplied through a fleet system) and by the large amount of space needed for fuel storage. At standard temperature and pressure, 100 cubic feet of gas has the energy equivalence of one gallon of gasoline. An average vehicle using 15 mpg of gasoline, equipped with two high pressure (2,400 psi) storage tanks each holding the equivalent of 300 cubic feet of gas, will have a range of 90 miles. Local fleet services such as taxicabs, buses, and light truck delivery are a few of the applications for methane and propane fueled vehicles. Methane powered vehicles use approximately 6,800 Btu's per mile. Although power loss occurs, due to methane's high octane rating, the hydrocarbon, carbon monoxide, nitrogen, and sulfur oxide emissions are reduced. With an octane rating of 130 for natural gas, and 110 for propane, spark plugs last twice as long as they would in a gasoline engine, and there is no build up of deposits in the combustion chamber. Refueling requires 5 to 10 minutes using quick fill techniques (at a pressure of 2,400 psi using special fittings) or by replacement with prefilled tanks.

Hydrogen Technology

In the near future hydrogen energy technology may also provide an alternative source of fuel for municipal vehicles. A synthetic fuel, hydrogen's primary advantages are that its raw material, water, is abundant, it emits a clean exhaust, and its fuel cycle can be independent of fossil fuels.

Hydrogen is stored by three methods: as a liquid (under -423°F), as a compressed gas (up to 2,000 psi), or in metal hydrides. Hydrides are solid metal alloys which absorb hydrogen like a sponge. Hydrogen can be indefinitely stored in a hydride and later recovered by applying heat (as generated from an auto engine) to the alloy. The hydride alloy most used consists of iron and titanium and is stored in a tank in granular form. Recharging a hydride takes 15 minutes.

Two problems associated with hydrogen vehicles involve performance and range. An engine using hydrogen may experience backfiring, which can be corrected by using a fuel injection system. Although more hydrogen can be stored in a hydride than in liquid form, hydrides are large and heavy and prove impractical for light vehicle use. The overall ratio between range and weight, however, is lower for larger vehicles and may encourage hydrogen use in municipal buses or in intracity trucks.

Electric Vehicles

Electric vehicles may prove to be an adequate substitute for conventional gasoline vehicles for short haul services. The majority of vehicle trips made each day are under 20 miles, so advances in technology which increase the range of electric vehicles between recharging promise to make electric transportation practical for municipal uses.

The technology behind electric vehicles differs from combustion engine technology, but is quite simple. Electric motors used to propel the vehicle utilize electric energy provided by an onboard power source. Portable sources of electrical energy are most often provided by batteries. The energy-to-work efficiency of a typical electric vehicle is approximately 80 percent; however, the combined weight of the batteries represents 30 to 40 percent of the total vehicle weight.

Electric vehicles are limited in the speed they can travel and in their range beween rechargings. Recharging requires 3 to 12 hours and usually is done overnight. Overnight recharging has the advantage of utilizing off-peak electrical generating capacity. While electric vehicles emit no pollutants, one must keep in mind that fossil fuels are generally used to produce electricity used to recharge batteries. From this viewpoint, the energy efficiency also drops to about 27 percent when energy used for electrical power generation is factored.

Improvements in recharging ranges are linked to improvements in battery storage. Possible improvements could come in the form of improved lead acid in all batteries or from a nickel zinc cell which is currently used by General Motors.

CHAPTER 2

CONTACTS AND CURRENT PROGRAMS

Responsibility for transportation contingency planning and activities at the Federal level is shared by various offices in the U.S. Department of Transportation. The main address for these offices is:

- Department of Transportation
  Nassif Building
  400-7th Street, S.W.
  Washington, D.C. 20590

Please note that the code following each name is for identification and should be included in written correspondence. Program activities and contact persons are listed below:

FEDERAL AGENCIES

Office of the Secretary

- Assistant Secretary for Governmental Affairs
  Provides technical information to State and local governments through the Office of Technology Sharing.
  Contact: Al Linhares
  Director, Office of Technology Sharing (I-25)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-4208

- Office of Intermodal Transportation
  Deals with procedures and materials relating to energy policy through its Energy Policy Division.
  Contact: Donald Trilling
  Director, Office of Intermodal Transportation (P-10)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-4220

- Office of Intermodal Transportation (cont'd)
  Provides an adjunct to energy conservation and materials transportation policy development through the Energy Policies Project.
  Contact: Don Igo
  Chief, Energy Policy Division (P-13)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-0783

  Examines energy utilization to determine impact of Federal policy on transit energy decision making through the Transit Energy Conservation and Federal Policy Project.
  Contact: Richard Nutter
  Planning Analysis Division (P-12)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-2916

- Office of Public Affairs
  Develops promotional materials on ridesharing, the 55 m.p.h. program, and other energy-related initiatives.
  Contact: Robert Beasley
  Regional Coordinator (S-38)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-4333

- Office of Environment & Safety
  Coordinates policies and programs, conducts research, and promotes information dissemination on bicycle transportation.
  Contact: Bill Wilkinson
  Environmental Coordination Division (P-23)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-4414

Federal Highway Administration

- Associate Administrator for Planning
  Provides direction for the FHWA policy statement and contingency plan through the FHWA Energy Council Project.
  Contact: William H. Ravenell
  Acting Associate Administrator for Planning
  (HPL-1)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-0585

- Office of Engineering
  Develops design and construction standards for bicycle facilities, administers the Bikeway Demonstration Program, and provides information on the design and funding of bicycle facilities.
  Contact: Tom Jennings
  Lanscape Branch (HNG-22)
  400 - 7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-0314

- Office of Environmental Policy
  Discusses the relationship between transportation improvements and energy consumption to assist policymakers in developing plans in the Panel Discussion on Energy Implications of Transportation Improvements Project.
  Contact: Don Emerson
  Environmental Quality Branch (HEV-22)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-1033

  Provides an exchange of information on state of the art through the Workshop on Energy Requirements for Transportation Systems Project.
  Contact: Larry Isaacson
  Chief, Environmental Quality Branch (HEV-22)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-9173

- Office of Highway Planning
  Provides, through the Ridesharing Branch, general information on pooling approaches which have been used and funding sources which are available.
  Contact: Barbara Reichart
  Chief, Ridesharing Branch (HHP-33)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-0210

  Provides, through the Transportation System Management Branch, information on TSM techniques and methods such as preferential and exclusive lanes for high occupany vehicles, parking policies and staggered work hours, etc.
  Contact: Gary Maring
  Chief, Transportation System Management
  Branch (HHP-32)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-0210

- Office of Highway Planning (cont'd)
  Reports on energy contingency planning with recommendations for appropriate policy actions through the Transportation Energy Contingency Planning Project. Workshops scheduled for the summer, 1980.
  Contact: Gary Maring
  Chief, Transportation System Management Branch (HHP-32)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-0210

  Provides basic background material on the energy situation for policymakers through the Energy Considerations in Transportation Planning Project.
  Contact: Bruce Cannon
  Chief, Planning and Programming Branch (HHP-15)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-1045

  Provides a series of six papers on state of the art and state of the practice which will improve analysis efforts under the Energy Considerations in the Urban Transportation Planning Process Project.
  Contact: Bonnie Danel
  Community & Environmental Planning Branch Branch (HHP-23)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-0215

  Analyzes alternative national energy supply policies through the Interaction Between National Energy Supply and Transportation-Related Energy Comsumption Project.
  Contact: Louise Skinner
  Technical Support Branch (HHP-22)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-0182

- Office of Research
  Conducts studies and disseminates information related to bicycling, pedestrian, and moped use.
  Contact: John Fegan
  Socio-Economic & Environmental Design Group (HRS-41)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-9710

National Highway Traffic Safety Administration

- Office of Heavy-Duty Vehicle Research
  Provides information on improving the energy consumption of trucks, heavy equipment, and commercial vehicles.
  Contact: William Close
  Director (NRD-20)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-4553

- Office of State Vehicle Programs
  Provides information on improving the fuel economy of vehicles through inspection, maintenance, and repair programs.
  Contact: Joseph Innes
  Chief, Engineering & Demonstrations Division (NTS-31)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-1597

- Office of Automotive Fuel Economy Standards
  Provides information on the energy efficiency of new passenger cars and approaches to improving it.
  Contact: Dick Strombotne
  Director (NRM-20)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-0846

- Office of Driver & Pedestrian Research
  Provides information on driver education approaches to energy efficient operation of passenger vehicles and also bicycles.
  Contact: John Eberhard
  Driver/Vehicle System Division (NRD-41)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-4892

- Officer of Driver and Pedestrian Programs
  Sponsors demonstration projects, conducts workshops and conferences, and provides technical assistance on bicycle and pedestrian safety.
  Contact: Larry Pavlinski
  Driver & Pedestrian Education Division (NTS-14)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-4910

Urban Mass Transportation Administration

- Office of Planning Assistance
  Administers the Planning Grant Program and conducts special energy planning research studies.
  Contact: Richard Steinmann
  Community Planner (UPM-13)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-2360

  Compiled a series of Energy Contingency Planning Prototype Studies and conducted a series of Energy Contingency Planning Workshops to assist localities with formulation of contingency strategies.
  Contact: Richard Steinmann
  Community Planner (UPM-13)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-5140

- Office of Policy Research
  Studies energy utilization and policy recommendations by selected commuter modes under the Public Transportation and Energy Project.
  Provides a procedural manual for conducting alternatives analysis and evaluation of urban transportation plans under the Urban Transportation Energy Accounts Methods Projects.
  Documents energy conservation advantages of public transportation through the What Are the Total Energy Advantages of Public Transportation Project.
  Contacts: Richard Cohen
  Office of Policy Research (UPP-30)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-0800

  Phil Hughes
  Director, (UPP-30)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-0800

- Office of Service & Methods Demonstrations
  Sponsors research in order to reduce travel time by transit, increase area of coverage of transit service, and improve the reliability and productivity of transit departments.
  Contact: Ronald J. Fisher
  Director (UPM-30)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 426-4995

- Office of Technology Development & Deployment
  Conducts research on advance transit vehicles and concepts.
  Contact: Henry Nejako
  Acting Associate Director (UTD-5)
  400-7th Street, S.W.
  Washington, D.C. 20590
  (202) 472-9261

LOCAL AGENCIES

- Kansas City, Missouri
  Transportation Energy Contingency Plan.
  The Mid-America Regional Council prepared this interim plan in response to a motor fuel shortage in the Kansas City area. It is part of a larger energy contingency project funded by the Urban Mass Transportation Administration.
  Contact: Lucinda S. Kemper
  Mid-America Regional Council
  20 W. 9th Street
  Kansas City, Missouri 64195
  (816) 474-4240

- Los Angeles, California
  Gasoline Shortage Contingency Plan.
  Los Angeles, California's, regional transit agency has prepared a contingency plan for its bus operation in the event a gasoline shortage of crisis proportions significantly restricts automobile mobility.
  Contact: Paul C. Taylor
  Southern California Rapid Transit District
  425 S. Main Street
  Los Angeles, California 90013
  (213) 972-6170

- Memphis, Tennessee
  Petroleum Shortage Contingency Plan.
  Memphis, Tennessee's, Transit Authority has prepared a contingency plan in case of a serious petroleum shortage. The plan defines the general transportation options available in an emergency situation as well as transit and paratransit options. It also discusses the application of the energy conservation strategies. System capacity is identified, potential fuel savings are estimated, and specific actions to be undertaken by the various Transit Authority operating departments are outlined.
  Contact: Kerry D. Roby
  Memphis Area Transit Authority
  P.O. Box 122
  701 N. Main Street
  Memphis, Tennessee 38101
  (901) 528-2893

- Metro-Dade County, Florida
  Fuel Management Program.
  Dade County developed a fuel management program which involves the rationing of fuel according to priority of use and level of fuel supplies available. The five phases of plan implementation address five levels of fuel availability from normal to critical.
  Contact: Dan Alvarez
  Energy Coordinator
  Dade County
  140 W. Flagler Street, Suite 1603
  Miami, Florida 33130
  (305) 579-5275

- Nashville, Tennessee
  Petroleum Shortage Contingency Plan.
  Nashville, Tennessee's, Metropolitan Transit Authority has developed a contingency plan which outlines the conditions which might lead to an emergency situation regarding petroleum supplies; discusses the major transit and paratransit options available to meet increased demand in a major fuel shortage; considers transit related options available to major employers and local decision makers; identifies the reserve capacity of the existing system; estimates fuel savings that could be realized; and defines a specific course of action for the Metropolitan Transportation Authority.
  Contact: Mike Harbour
  Metropolitan Transportation Authority
  60 Peabody Street
  Nashville, Tennessee 37210
  (615) 242-1622

- North Central Texas Council of Governments
  A Metropolitan Transportation Plan for National Energy Contingencies.
  The North Central Texas Council of Governments has developed a program by which the mobility of the workers of the region would be maintained in the event of contingency situations which would restrict local fuel supplies. Problems created by fuel shortages are identified and analyzed, implementation considerations are discussed, and 11 recommended strategies for dealing with a crisis are listed.
  Contact: William G. Barker
  North Central Texas Council of Governments
  360 Place
  P.O. Drawer COG
  Arlington, Texas 76011
  (817) 640-3300

- St. Louis, Missouri
  Transportation Energy Contingency Plan.
  St. Louis, Missouri's, East-West Gateway Coordinating Council has developed a plan which addresses an energy shortage that would affect ground transportation in the St. Louis region and recommends actions which could be implemented to help assure that travel to work can be maintained. The plan is designed to serve as a source of reference and preparedness for planners engaged in short term energy supply problems. Energy data is presented for the region along with a national overview. Recommendations and strategies are discussed and analyzed for effectiveness in dealing with several levels of energy shortages.
  Contact: James Bogart
  East-West Gateway Coordinating Council
  The St. Louis Area Council of Governments
  Pierce Building
  Suite 1200
  112 N. 4th Street
  St. Louis, Missouri 63102
  (314) 421-4220

- Seattle, Washington
  An Energy Crisis Contingency Plan.
  Seattle, Washington's, Metro Transit agency is updating a 1975 Energy Crisis Contingency Plan. The Plan discusses how to get the transit system to do more during an energy crisis to meet increased demands for public transit. It discusses how to serve areas not normally served by the transit system. The cost of implementing the plan is included along with a discussion of what to do if not enough fuel is available even for the transit system.
  Contact: Jackie Dewey
  Metro Transit
  821 2nd Avenue
  Seattle, Washington 98104
  (206) 447-6768

- Washington D.C. Metropolitan Area
  Washington Metropolitan Energy Conservation and Management Plan.
  The Metropolitan Council of Governments has developed thirteen energy conservation and community assistance measures for dealing with petroleum shortfalls within the Metropolitan Washington D.C. Area. The Council has recommended these measures to its constituent jurisdictions as an attempt to conserve 8 to 13 percent of average daily gasoline consumption.
  Contact: Council of Governments
  Information Center
  1875 Eye Street, N.W.
  Washington, D.C. 20006
  (202) 223-6800

CHAPTER 3

BIBLIOGRAPHY

ENERGY CONTINGENCY PLANNING

American Public Transit Association. "Spotlight on Energy." Reprints from Passenger Transport. Washington, D.C.: 1979.

(available from APTA, Washington, D.C., 202/828-2800).

American Public Transit Association. "Approaches to Energy Contingency Planning." Washington, D.C.: 1979.

(available from APTA, Washington, D.C., 202/828-2800).

Barker, William and L. Cooper. "Approach to Local Transportation Planning for National Energy Contingencies." Paper prepared for the 57th Annual Meeting of the Transportation Research Board. Washington, D.C.: January 1978.

(available from U.S. DOT* Office of Technology Sharing).

County of Santa Clara Transportation Agency. Emergency Transit Action Plan. Santa Clara: 1979.

(available from County of Santa Clara Transportation Agency, 1555 Berger Drive, San Jose, California 95112, 408/229-2884).

Central Ohio Transit Authority. Energy Emergency Action Plan. Columbus: 1979.

(available from Richard A. Schultze, Service Department, COTA, Columbus, Ohio, 614/228-3831).

EASYRIDE, Peninsula Transportation District Commission. The Energy Transportation Plan for the Peninsula Area. Hampton: 1979.

(available from EASYRIDE, 3400 Victoria Boulevard, Hampton, Virginia 23661, 804/722-2837).

Metropolitan Transportation Commission (Bay Area). Transit Energy Contingency Plans. Prepared by Susan Bachman. Berkeley: 1979.

(available from Susan Bachman, MTC, Hotel Claremont, Berkeley, California 94705, 415/849-3223).

North Central Texas Council of Governments. The Impact of the 1973-74 Oil Embargo on Transit Line Ridership: The Case of Ft. Worth, Texas. Arlington: 1977.

(available from Librarian, NCTCOG, P.O. Drawer COG, Arlington, Texas 76011, 817/640-3300).

North Central Texas Council of Governments. Review of Energy-Related Transportation Planning in the North Central Texas Region. Arlington: 1979.

(available from Librarian, NCTCOG, P.O. Drawer COG, Arlington, Texas 76011, 817/640-3300).

Public Technology, Inc. Local Government Role in Energy Contingency Planning. Washington, D.C.: 1979.

(available from PTI, 1140 Connecticut Avenue, N.W., Washington, D.C. 20036).

San Diego Transit, Energy Contingency Plan., San Diego: n.d.

(available from San Diego Transit, P.O. Box 2511, San Diego, California 92112, 714/238-0100).

U.S. Conference of Mayors. The Gasoline Shortage and the Cities. Washington, D.C.: 1979.

(available from USCM, 1620 Eye Street, N.W., Washington, D.C. 20006, 202/293-7133).

U.S. Department of Energy, Office of Intergovernmental Relations. Fuel Contingency Plans (including regional and local plans, status list of enabling legislation, literature review). Washington, D.C.: 1979.

(available from Public Technology, Inc., 1140 Connecticut Avenue, N.W., Washington, D.C. 20036).

U.S. Department of Transportation. Transportation Energy Contingency Planning: Local Experiences. Washington, D.C.: 1979.

(available from U.S. DOT* Technology Sharing Program).

U.S. Department of Transportation, Federal Highway Administration. Energy Considerations in Transportation Planning. Washington, D.C.: 1979.

(available from U.S. DOT* Federal Highway Administration, Office of Highway Planning, HHP-15, 202/426-0233).

U.S. Department of Transportation. Transportation Energy Contingency Strategies Part one - The Planning Process: Roles and Responsibilities; Part two - Synopsis of Actions. Prepared by the Massachusetts Institute of Technology Center for Transportation Studies, Cambridge: 1980.

(available from the National Technical Information Service 202/724-3382).

ENERGY CONSERVATION

Knorr, Rita E. and Marianne Millar. Projections of Direct Energy Consumption by Mode: 1975 - 2000 Baseline. Argonne National Laboratory: August 1979.

(available from NTIS, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161).

Kulp, G., et al. A Regional Analysis of Highway Energy Use: Selected Topics. Oak Ridge: 1979.

(available from Oak Ridge National Laboratory, Union Carbide Corporation, Nuclear Division, P.O. Box X, Oak Ridge, Tennessee 37830).

National Academy of Sciences, Transportation Research Board. Energy Efficiency of Various Transportation Modes. Washington, D.C.: 1978.

(available from TRB, 2101 Constitution Avenue, N.W., Washington, D.C. 20418, 202/369-6337).

National Academy of Sciences, Transportation Research Board. Energy Effects, Efficiencies and Prospects for Various Modes of Transportation. Washington, D.C.: 1977.

(available from Transportation Research Board, National Academy of Sciences, 2101 Constitution Avenue, N.W., Washington, D.C. 20418).

Oak Ridge National Laboratory. Regional Transportation Energy Conservation Data Book, Editions 1 and 2. U.S. Department of Energy: 1978.

(available from Technical Information Center, Oak Ridge, Tennessee 37830, 615/574-1000).

Public Technology, Inc. Energy Conservation in Municipal Fleet Management. Washington, D.C.: 1980.

(available from PTI, 1140 Connecticut Avenue, N.W., Washington, D.C. 20036

Public Technology, Inc. Transit Actions: Techniques for Improving Productivity and Performance. Washington, D.C.: 1979.

(available from PTI, 1140 Connecticut Avenue, N.W., Washington, D.C. 20036).

Massachusetts Institute of Technology. Transit, Paratransit and Ridesharing Strategies for Transportation Energy Contingencies. Cambridge: 1980.

(available, from MIT, Cambridge, Massachusetts).

Stanford Research Institute. Energy Study of Railroad Freight Transportation. Menlo Park: 1977.

(available from DOE, Office of Transportation Programs, 20 Massachusetts Avenue, N.W., Washington, D.C., 202/375-4435).

Treat, Ned, Bruce Williamson and Ethel McDonald. Handbook for State and Local Energy Conservation Programs in Transportation. Oak Ridge: 1979.

(available from Oak Ridge National Laboratory, Union Carbide Corporation, Nuclear Division, P.O. Box X, Oak Ridge, Tennessee 37830).

U.S. Conference of Mayors. The Gasoline Shortage and the Cities, Washington, D.C.: 1979.

(available from USCM, 1620 Eye Street, N.W., Washington, D.C. 20006, 202/293-7133).

U.S. Department of Energy. Program Plan for Transportation Programs. Washington, D.C.: 1979.

(available from DOE, Office of Transportation Programs, 20 Massachusetts Avenue, N.W., Washington, D.C., 202/375-4435

U.S. Department of Energy. Voluntary Truck and Bus Fuel Economy Improvement Program (brochure). Washington, D.C.: n.d.

(available from DOT, Office of Public Affairs, Room 10413, 400 7th Street, S.W., Washington, D.C. 20590).

U.S. Department of Transportation. Gasoline: More Miles Per Gallon (brochure). Washington, D.C.: 1977.

(available from U.S. DOT Office of Public Affairs).

U.S. Department of Transportation, Technology Sharing Program. Energy Conservation in Transportation. Prepared by the Technology Sharing Office at the Transportation Systems Center, Cambridge: 1979.

(available from TSC, Kendall Square, Cambridge, Massachusetts 02142, 617/494-2386).

U.S. Department of Transportation, Federal Highway Administration. Energy Impacts of Proposed Transportation Plans and Projects. Proceedings of a Panel Discussion, Washington, D.C.: 1979.

U.S. Department of Transportation, Technology Sharing Program. Selected Transportation Topics: Energy Primer. Cambridge, Massachusetts: Transportation Systems Center. Cambridge: n.d.

(available from TSC, Kendall Square, Cambridge, Massachusetts 02142, 617/494-2486).

U.S. Department of Transportation, Transportation Systems Center. Freight Transportation: Petroleum Conservation Opportunities--Viability Evaluation. Cambridge: 1979.

(available from TSC, Kendall Square, Cambridge, Massachusetts 02142, 617/494-2486).

U.S. Senate Committee on Environment and Public Works. Urban Transportation and Energy: The Potential Savings of Different Modes. Reissued by the Congressional Budget Office. Washington, D.C.: 1977.

(available from GPO).

U.S. Department of Transportation. Energy Activities of the U.S. Department of Transportation. Prepared by the Technology Sharing Program. Washington, D.C.: 1979.

(available from U.S. DOT,* Technology Sharing Program).

U.S. Department of Transportation, Urban Mass Transportation Administration. Innovation in Public Transportation. Washington, D.C.: 1978.

(available from U.S. DOT,* Technology Sharing Program).

*U.S. DOT, Office of Technology Sharing, 400 7th Street, S.W., Room 10407, Washington, D.C. 20590, 202/426-4208.

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Department of Transportation

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- PTI Project Staff:

Gary Barrett, Director	David Perry
Doris Ballenger	Kathy Perry
Rosalyn Dortch	Michael Replogle
Lisa Jolly	Peggy Schwartz
Lynn Mitwol	Carolene Smith
Helene Overly	Leigh Stokes
Edith Page	Erwin Young
	Judy Zimmerman

- Project Consultants:

William B. Hurd
Debbie Newman, Systan, Inc.

Public Technology, Inc.
1140 Connecticut Avenue, N.W.
Washington, D.C., 20036
202/452-7700

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U.S. Department of Transportation
400 7th Street, S.W.
Washington, D.C. 20590

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